

AMENDMENTS TO THE SPECIFICATION

In accordance with 37 CFR 1.125(b) and MPEP 608.01(q), a Substitute Specification is filed herewith, and it is respectfully requested to replace the entire specification with the Substitute Specification. A marked-up copy of the English translation originally filed with the entry into the US national phase of International application no. PCT/EP97/01192 is also filed herewith in accordance with 37 CFR 1.125(c) to show changes thereto.

The Substitute Specification filed herewith, together with the following amendments, replaces all prior versions and amendments of the specification.

After entry of the Substitute Specification filed herewith, it is further requested to amend the Substitute Specification as follows:

Page 1:

Before paragraph [0001], please add the following new text:

CROSS-REFERENCE

This application is the US national phase of International application no. PCT/EP97/01192 filed March 10, 1997, which claims priority to German patent application no. 196 09 119.5 filed March 8, 1996 and US patent application no. 08/705,237 filed August 30, 1996.

TECHNICAL FIELD

Please add the following new section heading after paragraph [0001]:

DESCRIPTION OF THE PRIOR ART

Please add the following new section heading after paragraph [0002]:

SUMMARY

Page 2:

Please amend paragraphs [0005]-[0008] as follows:

[0005] ~~The previously identified objects are attained by a method having the features of patent claim 1. Advantageous embodiments of the inventive method are found in patent claims 2 to 19.~~ The present teachings are directed to a method for cleaning objects that is capable of effectively removing inorganic and/or organic contaminants. The object is contacted with, preferably immersed in and/or sprayed with, a liquid cleaning composition consisting essentially of 65%-99% by weight water and the rest being substantially a glycol ether component and one or more other optional organic components, such as glycols and amino alcohols. The concentration of the at least one glycol ether is greater than the solubility of the at least one glycol ether in water at the cleaning temperature, such that the liquid cleaning composition is a two-phase solution at the cleaning temperature. The liquid cleaning composition may

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also, in preferred embodiments, have the property of forming a fully-miscible, one-phase liquid, such that all components are fully miscible or dissolved with each other, at a temperature that is lower than the cleaning temperature. The liquid cleaning composition is maintained in the state of an emulsion, in which a plurality of discontinuous glycol ether-rich droplets are suspended in a continuous aqueous phase, for at least a portion of the time that the liquid cleaning composition contacts the object at the cleaning temperature. Both the glycol ether-rich droplets and the continuous aqueous phase contact the object and the contaminants are highly effectively removed from the object by the liquid cleaning composition.

[0006] ~~According to the invention, azeotropic preparations, which are usable as active cleaning liquids, first~~ The present cleaning liquids have the advantage that their liquid phase effectively dissolves pigment fouling and fouling having ionic components, e.g., salts, due to the relatively high water proportion ~~when the azeotropic preparation used as the active cleaning liquid comes into contact with the to be cleaned objects in the state of being a liquid. The molecules of the at least one additional glycol ether component containing contains lipophilic groups, which additional component is preferably and is also a liquid under ambient conditions, thereby ensuring or at low treatment temperatures, ensure a good fat-dissolving capacity of the azeotropic preparation.~~

[0007] ~~If the azeotropic preparation used as the active cleaning liquid is azeotropic and is heated to its liquid-vapor phase transition point,~~ both water and the other component(s) ~~pass(es) preferably pass~~ into the vapor phase in a composition corresponding to the specific azeotrope due to its azeotropic character (for the

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definition of "azeotrope" see Römpps Chemie Lexikon [Römpp's Chemical Dictionary], 9th Edition (1989), page 323). Upon contacting the vapor of the azeotropic preparation with the to-be-cleaned object, a reliable cleaning and "rinsing" of ~~all fouling substances of the to-be-cleaned object~~ contaminants removed by the cleaning process takes place.

[0008] It is particularly advantageous that the vapor of the present cleaning liquid is not combustible due its high water content. Precautionary measures in this connection are unnecessary in a device used for carrying out the inventive method. The flash point of the vapor, to the extent that such a flash point exists at all, is above the temperatures normally occurring in such a cleaning method, but is at least above the boiling point of the liquid and is advantageously above about 200 °C. A flash point above 200 °C is therefore of special advantage, because the precautionary measures to be taken when carrying out the cleaning method are less extensive than when using active cleaning liquids having lower flash points. ~~The azeotropic preparation, which is present in the form of a vapor at least in a part of the inventive method, can be condensed into the liquid phase either on the to-be-cleaned object or by lowering the temperature, so that~~ Therefore, costly measures for protecting the atmosphere surrounding the device for carrying out the method, such as are required for conventional methods, can be eliminated to the greatest possible extent.

Page 3:

Please amend paragraph [0009] as follows:

[0009] ~~Hence, an additional advantage of the inventive method is the fact that the azeotropic preparation employed as the active cleaning liquid is scarcely consumed due to its recondensation to the greatest extent possible. A closed loop can thus be created in which the azeotropic preparation used as the active cleaning fluid need not be replenished at all or only in negligibly small amounts. This is additionally aided by making the inventive azeotropic preparation employed as the active~~ formulating the cleaning liquid so that it is free of surfactants that would precipitate on the filter surface during filtration of the active cleaning liquid for removing the fouling substances in conventional methods and would require a replenishment in conventionally-used solutions.

Please amend paragraph [0012] as follows:

[0012] When selecting ~~the inventive azeotropic preparations employed as the active~~ a preferred cleaning liquid and/or the other component(s) contained therein, which have molecules with hydrophilic groups (e.g., -OH, -NH₂, -C-O-C-, -C(=O)-C-, -C(=O)-O, etc.) and lipophilic groups (e.g., CH₂-chains or C₁- to C₁₂-alkyl-, etc.), in addition to good cleaning power, the following criteria stand in the foreground: The water content of the azeotrope of water and (a) further component(s) ~~must be so high is~~ preferably high enough so that there is no flash point and/or so that the vapor is not combustible. The liquid and the vapor formed by heating the liquid ~~may~~ preferably should not be toxic or have an ozone destruction potential, nor ~~may~~ should they cause a water hazard if the ~~preparation~~ cleaning liquid is inadvertently released into the

environment. Water-soluble components forming homogeneous azeotropes or also water-insoluble components forming heterogeneous azeotropes are suitable.

Page 11:

Please add the following new section headings and the following new paragraph after paragraph [0036]:

BRIEF DESCRIPTION OF THE DRAWING

[0036.1] Figure 1 is a schematic drawing of a device capable of carrying out the inventive method.

DETAILED DESCRIPTION OF THE INVENTION

Page 18:

Please amend paragraphs [0064]-[0065] as follows:

[0064] The drum of the cleaning device 12 described above was charged with to-be-cleaned material. The material, consisting of textiles, was treated in the first step under liquid cleaning conditions with azeotropic preparations at elevated temperatures. The azeotropic preparations and the respective treatment temperatures are indicated in Table I above. The material was immersed in the warm azeotropic preparation while

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being moved. The warm azeotropic preparation was fed in a closed loop from the drum of the cleaning device 12 through a filter device 16 and delivered to the precipitation chamber 4. In the filter device 16, predominantly inorganic fouling (salts) precipitated, which was drawn off. In the precipitation chamber 4, predominantly fat-containing fouling precipitated, which was likewise drawn off.

[0065] The first treatment step was followed by a second treatment step, which was also carried out under liquid treatment conditions. Fresh azeotropic preparation (see Table I for the composition; in each run, the azeotropic preparation of the second treatment step had the same composition as that of the first step) was supplied to the drum of the cleaning device 12 at an elevated temperature. The material cleaning liquid was supplied in a second closed loop from the drum of the cleaning device 12 to the precipitation chamber 4 via a filter device 16. The separation of inorganic and organic substances took place in the same way as in the first treatment step.